



CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION
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CONNECTICUT'S NITROGEN CONTROL PROGRAM

NITROGEN CREDIT EXCHANGE

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Arthur J. Rocque, Jr., Commissioner

Facilitating Hypoxia Control in Long Island Sound through a Nitrogen Credit Exchange Program

How Severe is LIS Hypoxia?

Each summer, the bottom waters in the western half of Long Island Sound experience hypoxia, or very low levels of dissolved oxygen. Connecticut's dissolved oxygen standard of 6.0 mg/l is violated each summer in the bottom waters from New Haven west to Greenwich. Similarly, New York's standard of 5.0 mg/l is violated in the western half of the Sound. Levels are low enough to seriously impact important fish and shellfish resources in Long Island Sound (LIS), rendering hundreds of square miles of habitat unusable by resident species each year.

The primary pollutant causing hypoxia is nitrogen. Nitrogen fuels the growth of algae in the Sound, which eventually decays, consuming oxygen in the process. There is enough nitrogen added by human activity to cause a severe low dissolved oxygen, or hypoxia problem each summer, often with levels falling below 1 or 2 mg/l. Recently, Connecticut and New York, in concert with the federal EPA, have completed plans for nitrogen control that identifies the maximum amount, or the Total Maximum Daily Load (TMDL), of nitrogen that can be discharged to Long Island Sound without significantly impairing the health of the Sound.

What Needs to be Done?

The Connecticut Department of Environmental Protection (CT DEP), the state of New York and the federal EPA, through the Long Island Sound Study (LISS), have developed nitrogen reduction plans to alleviate hypoxia. A TMDL analysis, required by federal law, was submitted to the US EPA, calling for a 58.5% reduction in the point and nonpoint source nitrogen loads originating in CT and NY as the next phase of management. On April 3, 2001 the EPA approved the CT and NY TMDL for Long Island Sound. Full implementation is scheduled for 2014.

The sources of nitrogen are well understood and are dominated by sewage treatment plant contributions although nonpoint sources, such as urban runoff and atmospheric deposition, are large enough to be of managerial interest. Nevertheless, most of the nitrogen control burden will fall upon point sources, particularly municipal sewage treatment plants (STP). Some treatment plants can more cost-effectively remove nitrogen because of their size and design. In addition, the location of STPs determines how directly their nitrogen load affects the hypoxia in western LIS. Because of these factors, the CT DEP has asked the State Legislature to approve a unique and innovative "Nitrogen Credit Exchange Program". This program would provide substantial flexibility to the regulated community, minimize costs, and assure we meet water quality goals.

How will a Nitrogen Credit Exchange Help?

Municipal dischargers may be willing (and some already are) to remove more nitrogen than their original allocation calls for and sell the excess reductions to the exchange where it may be purchased by plants where nitrogen removal would be more costly than purchasing. Both sellers and buyers would benefit economically, and the dissolved oxygen improvement in the Sound would be the same as if each individual plant met its allocation.

The Nitrogen Credit Exchange will allow considerable flexibility in where reductions can take place, rather than forcing an equal level of nitrogen reduction from each source. The highest impact and least costly projects that move forward quickly will be able to remove nitrogen below their individual allocations. The Credit Exchange will establish an economic allocation taking both cost and environmental impact into consideration. The excess nitrogen removed can then be sold, in the form of

a **'nitrogen credit'** to the exchange where other sources may purchase them at a cost lower than would be incurred by implementing additional projects at those sources. It is anticipated that this type of nitrogen credit exchange will reduce the capital cost for nitrogen removal by more than \$200 million.

CT DEP has promoted such a credit exchange program to ensure management costs are minimized. Credit purchasing between point and nonpoint sources might also be implemented as part of the credit exchange program. In general, nonpoint source controls are much more costly and the nitrogen load is dominated by point sources. Consequently, purchase of point source credits to offset nonpoint reduction requirements may be an attractive way to reduce costs.

Is Nitrogen from all Sources the Same?

Nitrogen from all sources is the same but has different effects on dissolved oxygen levels in Long Island Sound. Coastal sources in eastern Connecticut have less impact per pound of nitrogen discharged than sources in western Connecticut that are closer to the hypoxia hotspot. That is because nitrogen is lost or attenuated during transport through the Sound. For example, nitrogen from New London has only about 18% of the dissolved oxygen impact that nitrogen from Norwalk has. Similarly, nitrogen is attenuated as it flows down rivers, so about 20% of the nitrogen discharged in Farmington, for example, is lost before it reaches the mouth of the Connecticut River.

How will Differences in Nitrogen Impact affect Credit Values?

As part of the credit exchange program, exchange rates would be established. These exchange rates would be applied much like currency exchange rates are used to convert foreign currencies. For example, credits exchanged between New London and Norwalk would apply a 0.18 exchange factor. So if New London had a target of removing 100 lbs of nitrogen per day from their discharge, they would need to buy only 18 lbs of nitrogen per day of Norwalk's excess. Clearly, this would help Norwalk defray the cost of their nitrogen removal project and save New London the cost of removing a large load of nitrogen at the same time. And the oxygen benefit for Long Island Sound would be the same as if New London removed their own

nitrogen. Because sales and purchases will be through an exchange rather than between individual entities, exchange factors would vary depending on sources of those credits sold and the location of the purchasing entity.

What about Local Water Quality?

In cases where harbors or embayments are impacted by nitrogen from local sources, local water quality needs will take precedence. In no case will local water quality management objectives be allowed to be compromised by credit buying.

How will the Price of Nitrogen be Set?

In the CT DEP proposed legislation, the value of nitrogen credits will depend on both the construction cost and the cost of operating those plants that remove nitrogen. To ensure prices are fairly set, exchange rates among geographic localities would be applied, and a system would be established to account for excess or deficit credits on an annual basis. It is proposed that a Nitrogen Credit Exchange be established to regulate nitrogen buying. The price per pound of nitrogen discharged each day is expected to be in the range between \$2 and \$30 over the fifteen year period.

Could Nitrogen be "Banked"?

It is unlikely that nitrogen reductions achieved at an individual source could be saved in a sort of "rainy day" fund for use or sale in future years. At most, nitrogen might be banked for use within a 12 month period so a 12-month average discharge remains below nitrogen reduction targets. Protecting Long Island Sound from severe hypoxia means that nitrogen control has to occur continuously, year after year. If several sources had banked nitrogen for a few years and then coincidentally all had a bad operational year, which increased the nitrogen load to Long Island Sound substantially, oxygen levels in the Sound would deteriorate and imperil the health of the Sound. The Nitrogen Credit Exchange is expected to retain credits for sale in the event that the production of credits does not meet the established targets.

Does Connecticut Support Credit Exchanging?

CT DEP has proposed and strongly supports a Nitrogen Credit Exchange Program as the best way to meet our water quality goals. In addition, many municipalities also recognize the flexibility and cost savings it affords and also strongly support the proposal. Connecticut has been involved with air pollutant credit exchanging that attests to the successes in improving air quality that can be achieved while saving on overall management costs.

For more Information...

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